Citation:

Teixeira Rde C, Molina Mdel C, Zandonade E, Mill JG. Cardiovascular risk in vegetarians and omnivores: A comparative study. *Arq Bras Cardiol.* 2007 Oct; 89 (4): 237-244. English, Portuguese.

PubMed ID: 17992380

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To describe and analyze the cardiovascular risk in vegetarians and omnivores residing in Greater Vitória, State of Espírito Santo, Brazil.

Inclusion Criteria:

- Individuals who reported not to consume meat (whether red or white) for at least five years, were classified as VEG
- Individuals participating in the MONICA-OMS Project/Vitória who reported not to refrain from eating meat in the questionnaire on eating habits were classified as OMNIs.

Exclusion Criteria:

None.

Description of Study Protocol:

Recruitment

- The intention to conduct the research was publicized in natural and/or vegetarian restaurants and in Adventist churches in the cities of Vitória and VilaVelha/ State of Espírito Santo as a means to invite VEGs of both genders to participate in the study
- Of the 92 eligible individuals, 67 (73%) underwent all the tests required for determination of the cardiovascular risk and answered the questionnaires for acquisition of socioeconomic data, as well as of data on self-reported health and life habits
- The questionnaires and protocols for laboratory test performance were identical to those

used in the MONICA-OMS Project/ Vitória8. The OMNI group was selected from the database of the 1,663 participants of the MONICA-OMS Project/Vitória. For each VEG, at least two OMNIs of the same gender, age, socioeconomic class and race were selected, with the purpose of obtaining a matched sample in relation to these criteria and increasing the power of the statistical tests to be performed. If more than two OMNIs were eligible for each VEG, the choice was made by drawing lots. Although data collection had been made at different moments (1999-2000 for OMNIs and2003-2004 for VEGs), the method used was the same at the two moments.

Design

- A historical cohort study with 201 individuals
- 67 individuals who had been following a vegetarian diet for at least five years, and who were from Greater Vitória, as well as 134 omnivores participating in the MONICA Project/Vitória matched for socioeconomic class, gender, age and race were included. Biochemical and hemodynamic measurements were obtained in the Cardiovascular Investigation Clinic of UFES. For comparison of proportions, the χ^2 test was used, and the Prevalence Ratio was calculated. The CVR was calculated using the Framingham algorithm for the group as a whole, and for separate genders
- The MONICA Project/Vitória was developed with the purpose of determining the major risk factors for cardiovascular diseases in the population of the city of Vitória by means of a survey and analysis of socioeconomic, biochemical, and anthropometric data, as well as data on eating and health habits in a probabilistic sample of inhabitants of the city.

Dietary Intake/Dietary Assessment Methodology

- The socioeconomic, health, eating habits, and physical activity questionnaire administered during a home visit was elaborated and used during the MONICA Project/Vitória, and the clinical tests were performed at the Cardiovascular Research Clinic of the Postgraduate Program in Physiological Sciences in the two groups studied. During the home visit, personal data were collected, as well as parameters to define the socioeconomic class, level of education, tobacco use (a possible confounding factor, as is the use of alcoholic beverages) and physical activity
- In this study, individuals who performed physical exercises at least three times a week for at least 30 minutes per section were considered to perform regular physical activity.

Blinding Used

Not applicable.

Intervention

Not applicable.

Statistical Analysis

- According to the score obtained, the probability of developing coronary artery disease in five to 10 years was calculated using the table developed in the Framingham study. CVR stratification in this study was performed according to the Brazilian Society of Cardiology (BSC): Low risk-event risk <10% in five to 10 years; average risk-event risk ≥10% but <20%, and high risk-event risk ≥ 20%
- Data regarding continuous quantitative variables are expressed as mean ± standard deviation, and those regarding qualitative variables are expressed as percentages

- A bivariate analysis was performed to compare the means, using the Student's T-test
- Comparison of proportions was performed using the chi-square test (χ^2)
- The prevalence ratio (PR) was used as a measurement of association
- To evaluate the statistical significance of the associations, the null hypothesis was PR=1
- All tests were two-tailed tests and the level of statistical significance was predetermined at 5%. The statistical analysis was performed using the SPSS software program for Windows (version 10.0.1)
- Since the sample size was determined by screening the VEGs (total of 67), the test power associated with the study sample size was calculated a posteriori. Two controls were defined for each case to increase the test power. The test power associated with the sample size was calculated for the main variables of the study (WHR, overweight, glycemia, hypertension and cholesterol). The minimum power value found was 89%
- The EPIINFO software program was used for this calculation.

Data Collection Summary:

Timing of Measurements

- 1999-2000 for OMNIs and 2003-2004 for VEGs
- The mean duration of compliance to the vegetarian diet in the group VEG was 19±10 years, and most of the individuals (73%) in this group were lacto-ovo vegetarians. In the sample, 14% were strict vegetarians, 10% were pesco-vegetarians, and only 3% were lacto-vegetarians.

Dependent Variables

- Cardiovascular risk
  - Total cholesterol
  - HDL-C
  - Glucose
  - Hypertension.

Independent Variables

- Vegetarian diet; no meat consumption for at least five years
- Omnivorous diet.

Control Variables

None.

Description of Actual Data Sample:

- *Initial N:* 92 VEGs and 1,663 OMNIs
- *Attrition (final N):* 67 VEGs and 134 OMNIs
  The mean duration of compliance to the vegetarian diet in the group VEG was 19±10 years, and most of the individuals (73%) in this group were lacto-ovo vegetarians. In the sample, 14% were strict vegetarians, 10% were pesco-vegetarians and only 3% were lacto-vegetarians
- *Age:* 47±8 years
- *Ethnicity:* Brazilian (Latin)

- *Other relevant demographics:* None
- *Anthropometrics*

Measurements and indicators	Vegetarian		Omnivorous		P-value
	Mean	SD	Mean	SD	
BMI, kg/m^2	22.6	3.1	26.7	5.1	0.000

- ***Location:*** Greater Vitória, State of Espírito Santo, Brazil.

Summary of Results:

- Time spent being physically active was greater in the OMNI group compared to the VEG group (P=0.037)
- Mean systolic and diastolic blood pressure were significantly lower in VEGs than in OMNIs (P=0.000)
- The VEG group had lower BMI and waist-to-hip ratio than the OMNI group (P=0.000)
- All biochemical measures related to lipid profile were lower in the VEG group, except for HDL cholesterol. Blood glucose was also lower among the VEG group compared to the OMNI group.
- The VEG group also had lower cardiovascular disease risk factors than the OMNI, and a lower chance of developing cardiovascular disease.

Author Conclusion:

Unbalanced omnivorous diet with excess animal protein and fat may be implicated, to a great extent, in the development of non-communicable diseases and conditions, especially in the CVR.

Reviewer Comments:

None.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes

4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	No
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	No
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	**Were study groups comparable?**	No
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	???
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	No
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	No
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes

4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	N/A
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	No
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A

7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	N/A
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	N/A
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	No
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	Yes
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	No
10.2.	Was the study free from apparent conflict of interest?	Yes